
Wax Patterns



- Definition
- Dental wax
- Composition of dental wax
- Classification of dental wax
- Inlay wax
- Types of inlay wax
- Die trimming
- Armamentarium
- Wax pattern fabrication

# Wax Patterns

- ***WAX PATTERN*** ⇒ Precursor of cast restoration
- Final restoration can be no better than its wax pattern





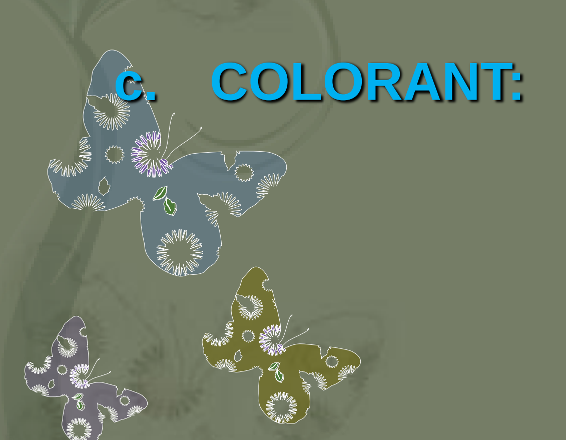
1. ***Dental wax*** = thermoplastic molding material that is solid at room temperature.

2. **Composition of Waxes:**

   a. **BASE Wax:**
      - hydrocarbons [eg, PARAFFIN] or ester types;

   b. **MODIFIER Waxes:**
      - Hydrocarbon or ester types;

   c. **COLORANT:**



# Classification of dental waxes

***Inlay wax***

- 1- Type I
- (hard=intra oral)
- 2- Type II
- (Soft= extra oral)

***Impression wax***

- 1- correction
- 2- Bite plate

***Processing wax***

- Sticky wax

# Composition of inlay casting wax

Composition of inlay casting wax

- 1- Paraffin wax (40-60 %)
- 2- Dammar resin: reduces flaking
- 3- Carnauba or bees wax : raise the melting temp.
- 4- Dyes: to provide color contrast



# Types of Inlay wax: (according to ADA)

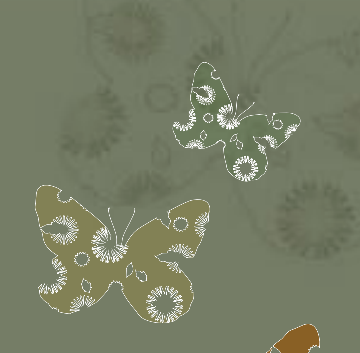


- *Type I:* medium hardness wax

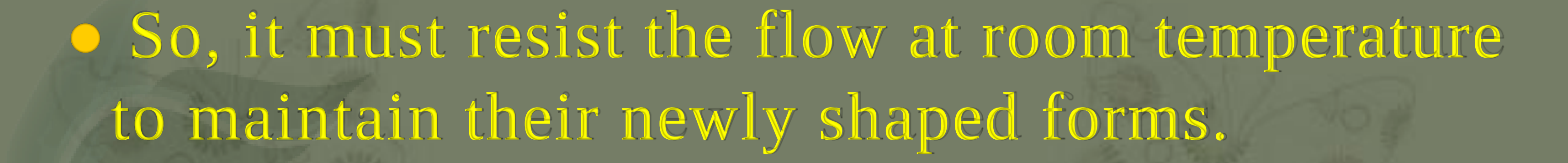
- Used with the direct technique for making patterns in the oral cavity.
- must not flow appreciably at mouth temperature



# ✹ *Type II:* softer wax



- Used for the indirect fabrication of castings



- So, it must resist the flow at room temperature to maintain their newly shaped forms.





# Requirements of good inlay wax

- 1- Be of some color that will contrast easily from the stone die.
- 2- Flows readily when heated without chipping, flaking or loosing smoothness.
- 3- When cooled, it must be rigid.
- 4- Accepts addition and capable of being carved without chipping or distortion.

- 5- Has a minimum rate of stress relaxation after carving and before investing to prevent any distortion.

- 6- Preserves the fine and sharp details till investing without distortion.

- 7- Burnout without leaving any residual ashes that might contaminate the produced casting.



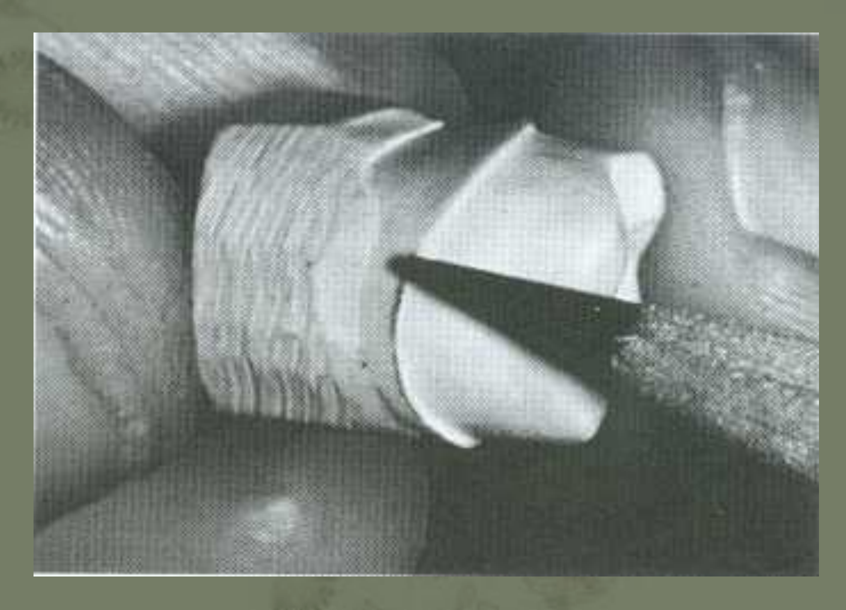
# Preparation of the die prior to wax pattern construction



# Die Trimming

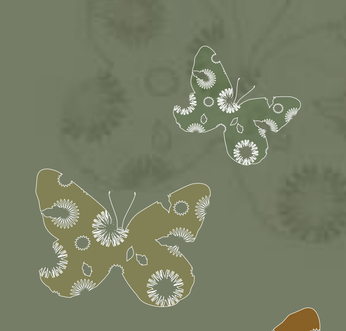
- 1. Remove most of excess stone with #7 lab carbide bur with protective eyewear
- 2. Fine trimming with scalpel or cleoid-discoid carver
- 3. Margin should be sharp and distinct for access, but it should not be undermined
- 4. Uncut tooth beyond finish line should be maintained to provide proper contours in wax

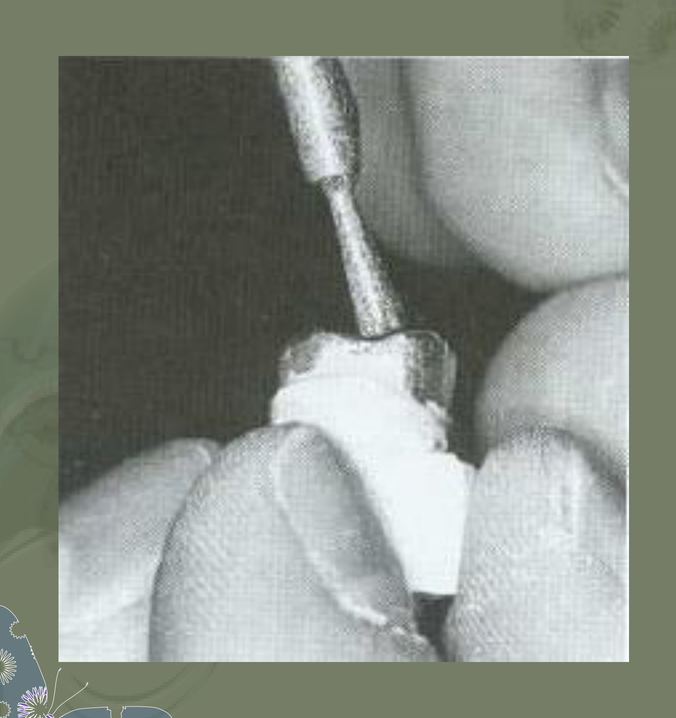






# Application of the die spacer







# Different Techniques for Fabrication of wax Pattern:

## 1- Direct Technique:

Pattern is constructed inside patient's mouth

Indicated for inlays and posts.

Medium or hard wax is usually used for this method

## 2- Indirect Technique:

Pattern is constructed outside the patient's mouth

Most commonly used method due to its accessibility, visibility & time saving for both dentist and patient.

# 3- Indirect-Direct Technique:

**Pattern is constructed indirectly and fine adjustments are carried out intra-orally before its casting.**

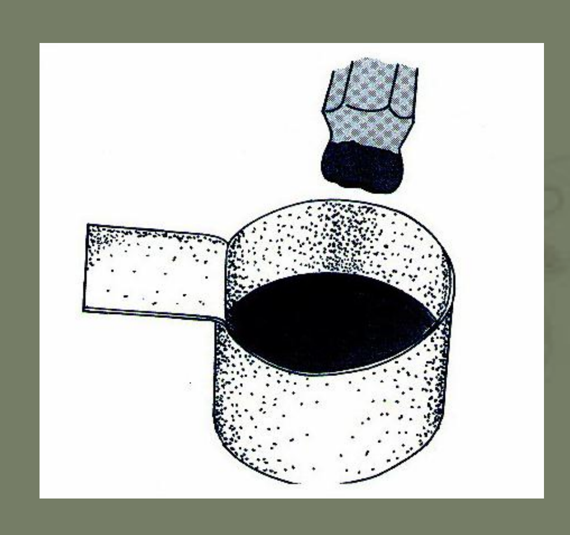


# Methods of construction of wax pattern:

Methods of construction of wax pattern:

1-dipping method





**2-addition method**

-by heated carver

-strain collected due to multiple addition=release with time=deformation

**3-molten press method**

- most suitable method
- produce closely adapted pattern free of folds or irregularities
- molten wax applied and pressed by finger, then electric wax instrument used for wax addition

**4- injection method**

- used for researches
- injection of the molten wax through metallic syring

**5- CAD/CAM system**



# Armamentarium

- 1- Bunsen burner





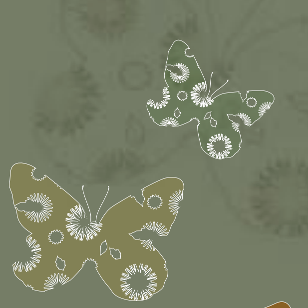
# Electric Waxing set ( Thermojet)

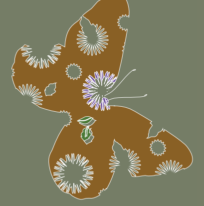






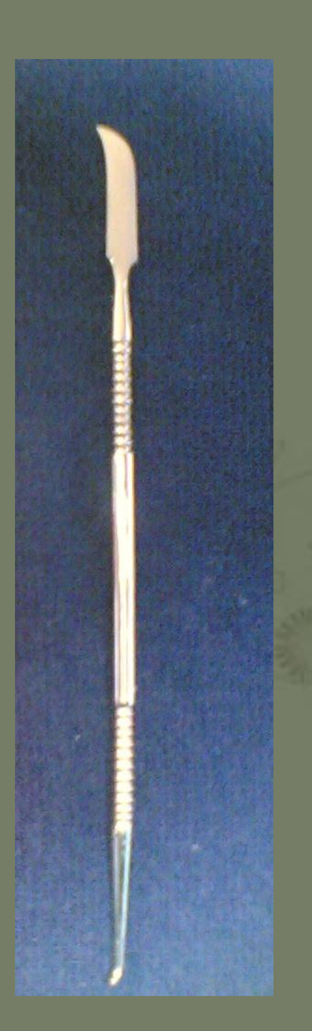

# Waxing Instruments





## 2- Wax Carvers

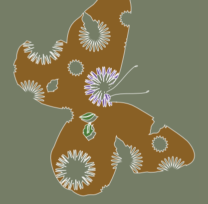


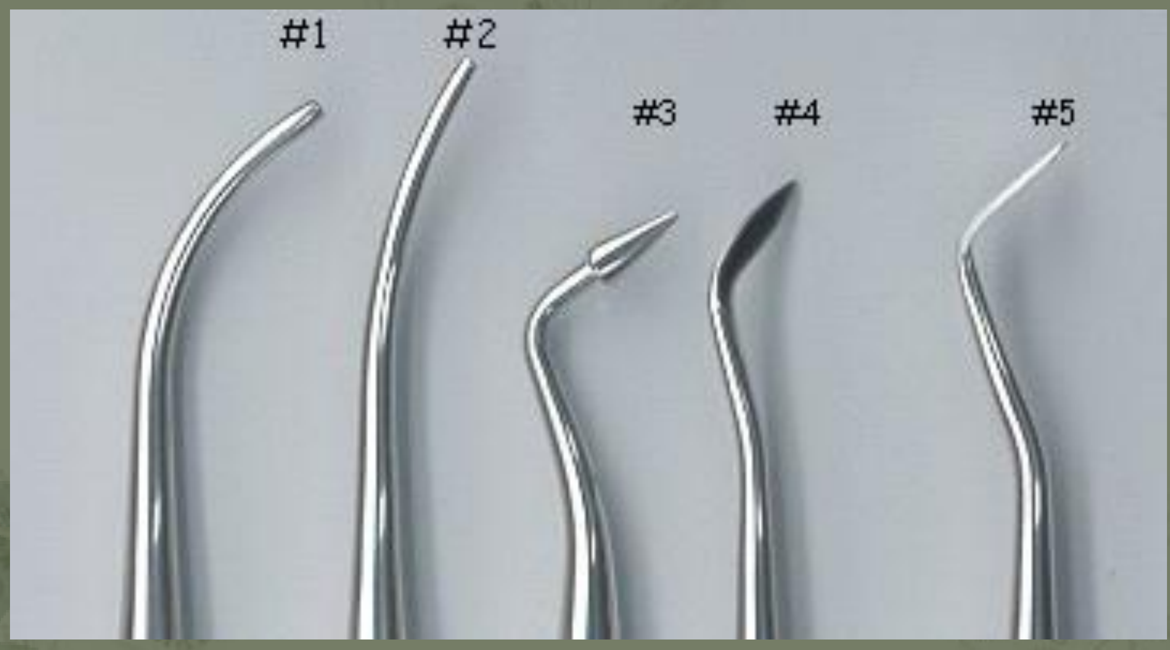




# 3- PK Thomas set (1-5)












4- Separating liquid

5- Soft wax brush

6- Occlusal indicator powder (zinc stearate).

7-Wax gauge (caliper)

8- Inlay wax.

9- die lubricant





# Wax pattern fabrication

1. Coping fabrication
2. Axial contours
3. Emergence profile
4. Occlusal morphology
5. Margin finishing

# Coping fabrication

The coping is a thin structure closely adapted to the prepared area of the die, and serves as a foundation for the axial contours and occlusal morphology of the wax pattern.



The coping can be formed using:

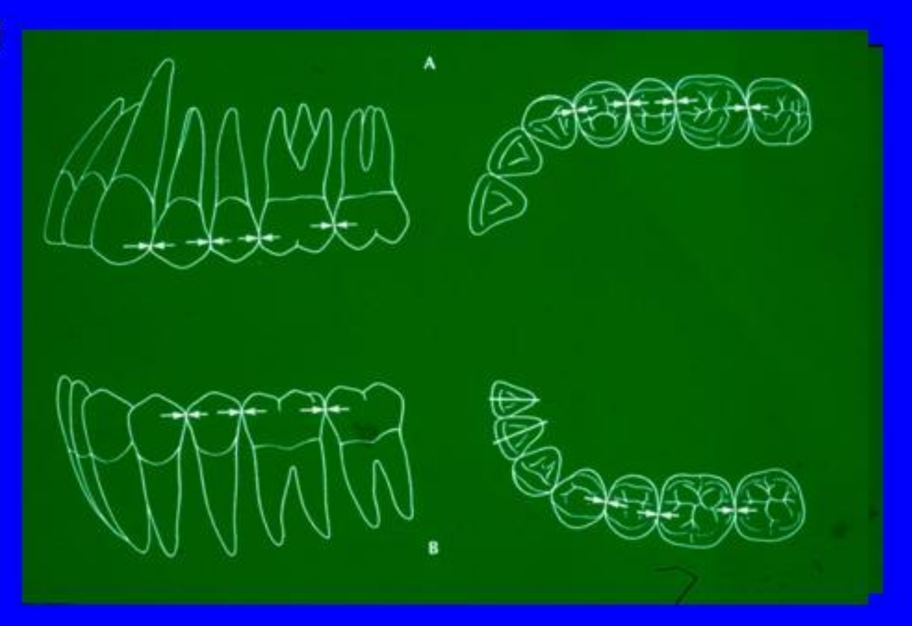
1. Inlay wax
2. Heated resin material
3. Vacuum-adapted polystyrene
4. Pressure-formed polypropylene

# Axial contours

The proximal contacts (mesial & distal) and the facial and lingual axial contours of the wax pattern, are waxed up onto the finished coping.

<u>A) Proximal contacts</u>

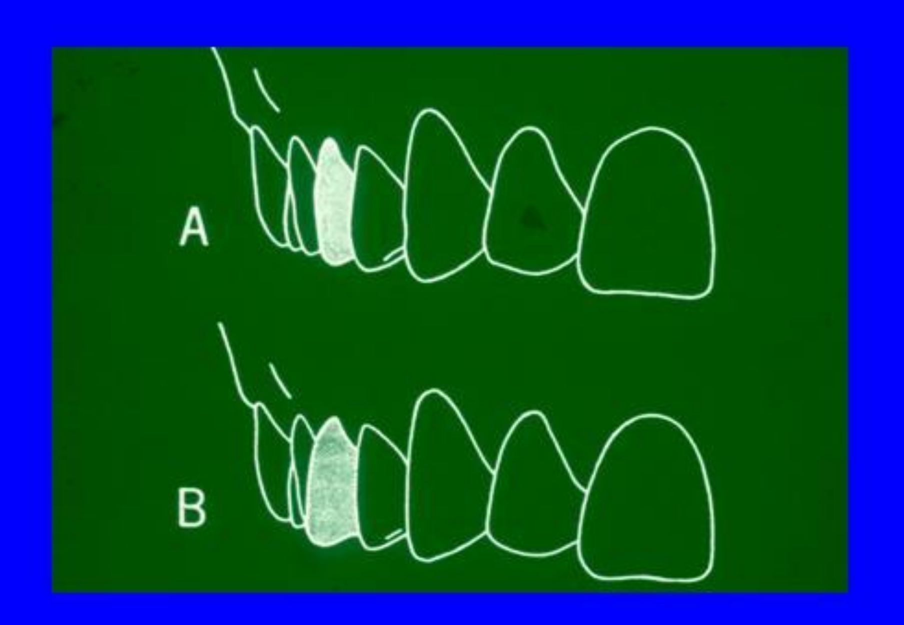
- ***Occlusogingival location :***
  - Occlusal third of the other posterior crowns
  - Maxillary first and second molar in the middle third
- ***Faciolingual location :***
  - Facial aspect of the middle of the posterior teeth
  - Maxillary first and second molar centered faciolingually



# Axial contours

<u>B) Facial and lingual contours</u>

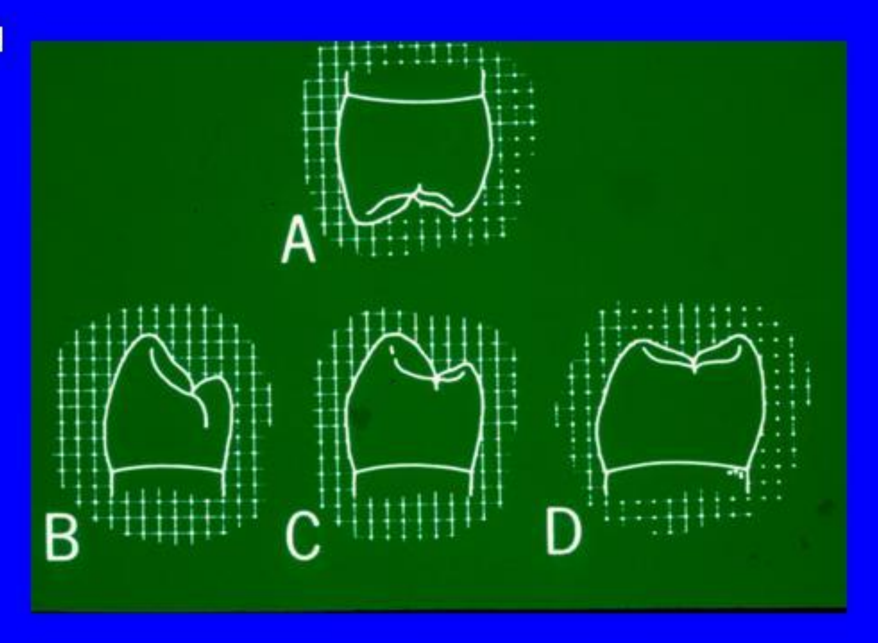
In harmony with, the normally positioned, adjacent teeth.



# Axial contour

<u>c. Height of contour (Maximum prominence of a surface)</u>

- *Facial surface of posterior teeth*
  - Occurs in the cervical third.
  - Extends approximately 0.5mm (beyond the cementoenamel junction)
- *Lingual surface of maxillary posterior teeth*
  - Occurs in the cervical third
  - Extends approximately 0.5mm
- *Lingual surface of mandibular posterior teeth*
  - Occurs in the middle third
  - Extends approximately 0.5mm mandibular 1st premolar
  - Extends approximately 0.75mm on mandibular 2nd premolar
  - Extends approximately 1mm on mandibular molars

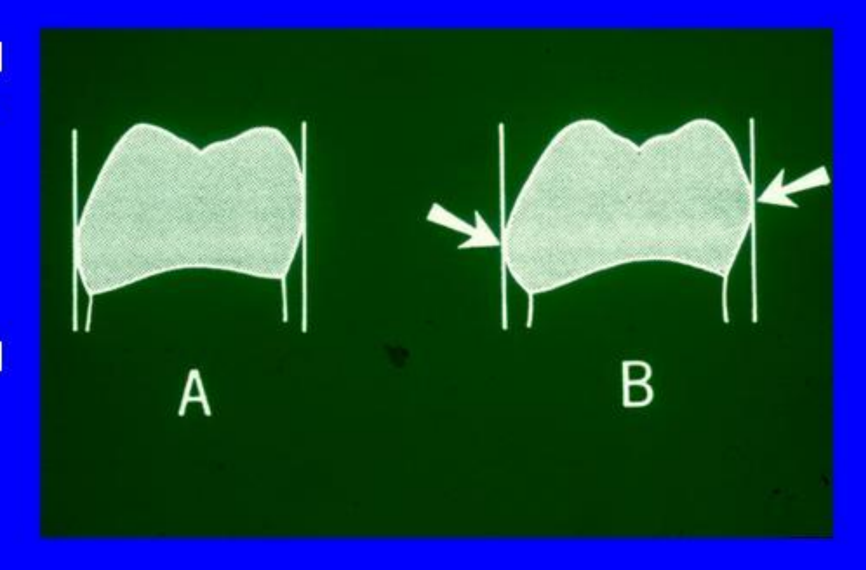


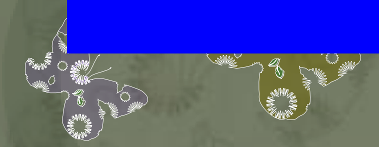
# Axial contour

d. Emergence profile

- The part of the axial contour which extends from the gingival sulcus to the height of contour. It must be a straight profile in the gingival third of the axial surface.
- This will assist the cleaning efficiency of the toothbrush and floss.

Over contour / Undercontour





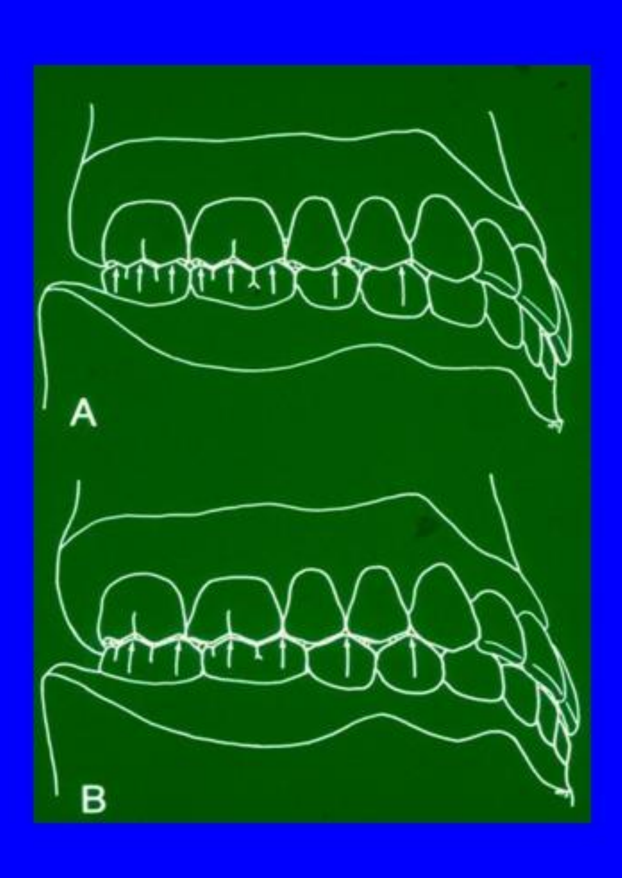
# Occlusal morphology

The occlusal morphology of the wax pattern is waxed up when axial contours are essentially complete.

The occlusal scheme can be classified by the location of the occlusal contact made by the functional cusp on the opposing tooth in centric relation.

Two types

1. cusp-fossa
2. Cusp-marginal ridge



# Classification of occlusal arrangements

| TYPE | CUSP-FOSSA | CUSP-MARGINAL RIDGE |
|---|---|---|
| Location of occlusal contact on opposing teeth | Occlusal fossae only | Marginal ridges and occlusal fossae |
| Relation with opposing tooth / teeth | Tooth-to-tooth | Tooth-to-two teeth |
| Advantages | Occlusal forces are directed parallel with the long axis of the tooth. These forces are near the center of the tooth,placing little lateral stress on the tooth | Most natural type of occlusion, found in 95% of adults. Can be used for single cast restorations |
| Disadvantages | Rarely found in natural occlusion, and so can only be used when restoring several contacting teeth and the teeth which oppose them | Food packing and displacement of teeth may arise if a functional cusp wedges into a lingual embrasure |
| Application | Full mouth reconstruction. | Most cast restorations done in daily practice. |

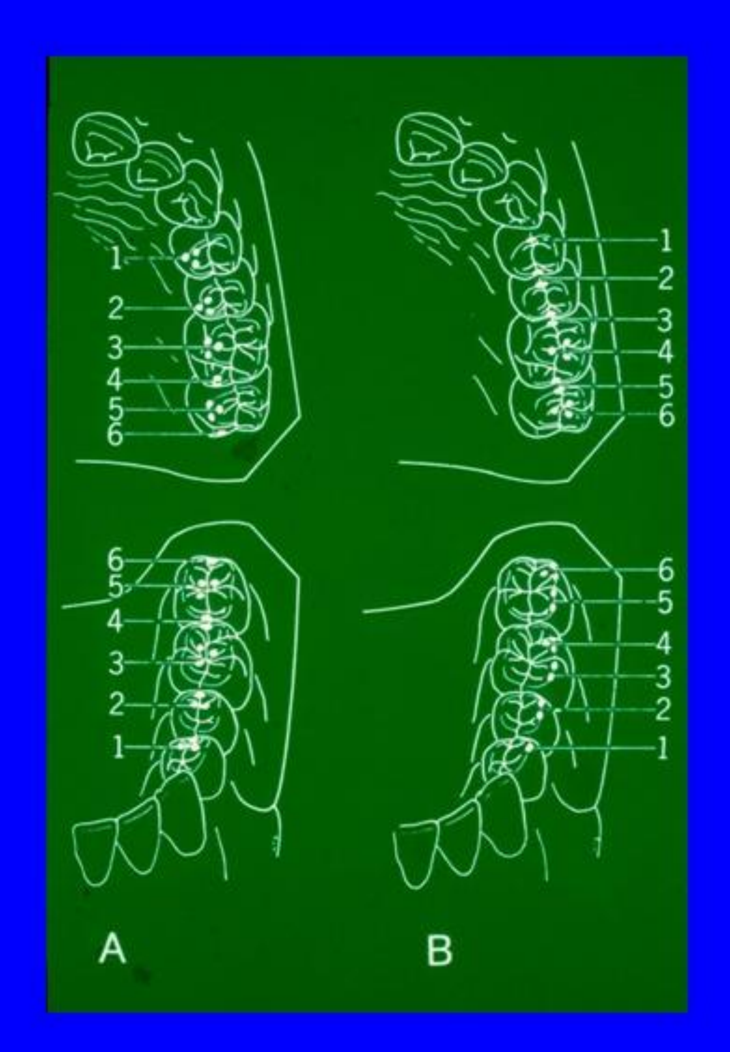
# Cusp-marginal ridge arrangement

| MANDIBULAR BUCCAL CUSPS | MAXILLARY OCCLUSAL SURFACE |
|---|---|
| 1st Premolar | Mesial marginal ridge of 1st premolar |
| 2nd Premolar | Distal marginal ridge of 1st premolar<br>& Mesial marginal ridge of 2nd premolar |
| Mesiobuccal cusp of 1st molar | Distal marginal ridge of 2nd premolar<br>& Mesial marginal ridge of 1st molar |
| Distobuccal cusp of 1st molar | Central fossa of 1st molar |
| Distal cusp of 1st molar | *(Usually nonfunctional)* |
| Mesiobuccal cusp of 2nd molar | Distal marginal ridge of 1st molar<br>& Mesial marginal ridge of 2nd molar |
| Distobuccal cusp of 2nd molar | Central fossa of 2nd molar |
| Distal cusp of 2nd molar | *Usually not present)* |

# Cusp-marginal ridge arrangement

A. CUSP- FOSSA

B. CUSP-MARGINAL RIDGE



# Functional waxing of the occlusal morphology

- The occlusal morphology of posterior teeth can be waxed up by adding wax in six specific and progressive stages.

  Wax additive technique

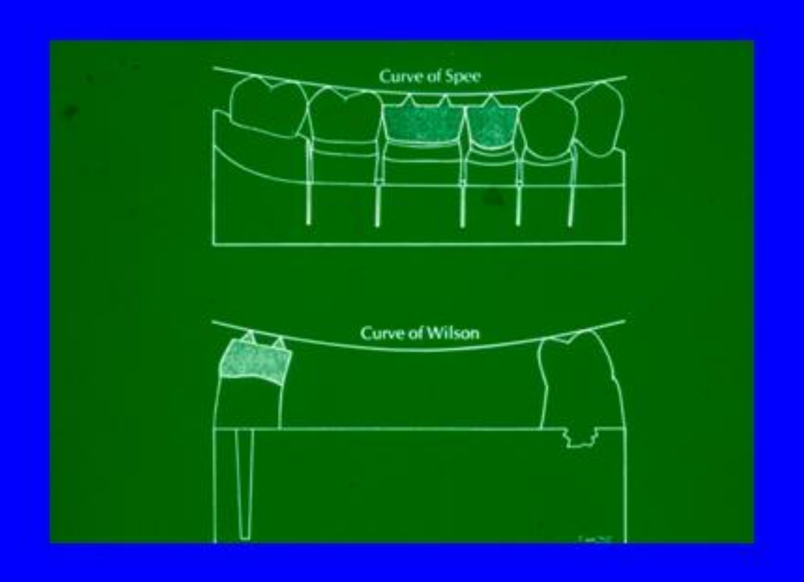
  Colour coded inlay can be used for visual convenience.

- The six stages of functional occlusal waxing are:
- Cones (cusp positions)
  PKT no. 1 — Yellow wax
- Marginal & cusp ridges
  PKT no. 1 — Blue wax
- Buccal & lingual ridges
  PKT no. 1 — Red wax
- Axial contours
  PKT no. 1 & 4 — Green wax
- Triangular ridges — Red wax
  PKT no.1
- Supplemental anatomy
  PKT no. 1, 3 & 5 — Green wax



# Cusp- marginal ridge for mandibular teeth

- The occlusal morphology of the wax pattern is waxed up when axial contours are essentially complete.



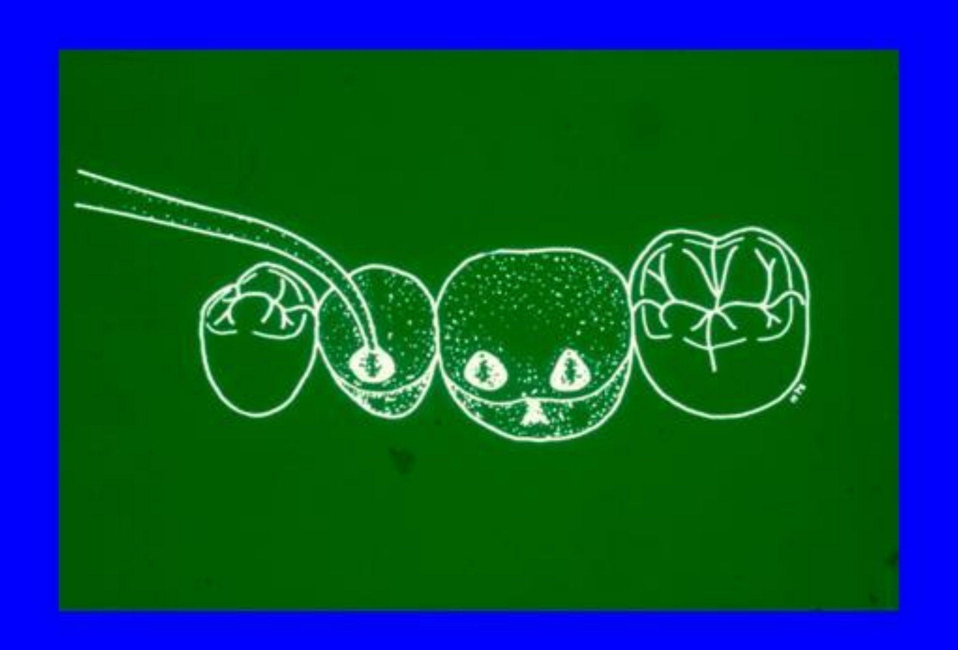
# Cusp- marginal ridge for mandibular teeth

Cones for buccal cusp : PKT no.1

Junction of buccal one-third and lingual two-thirds of mandibular teeth.

Mesiodistally in line with opposing fossae or marginal ridge.

Length of mandibular cusp determined by contact in the fossa or on the marginal ridges of the maxillary teeth



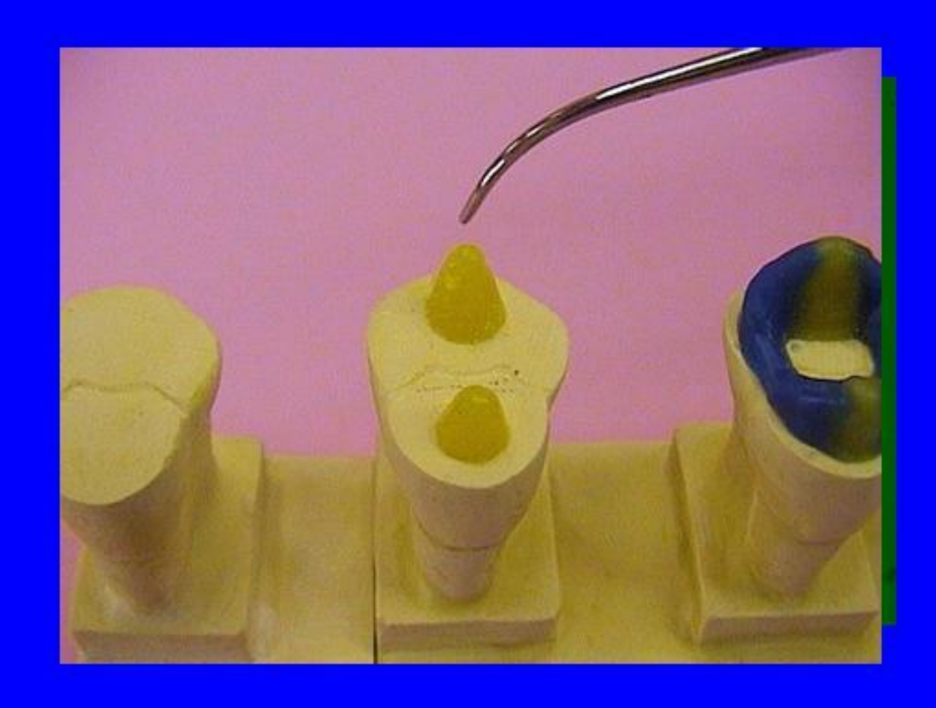
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# Cusp- marginal ridge for mandibular teeth

Buccal ridges : PKT No .1

Buccal ridges from the tip of the cone to its base and will produce the outline of the final contour of the buccal surface.

Check in centric and lateral excursions and make sure that it is not overcontoured



# Cusp- marginal ridge for mandibular teeth

Mesial and distal cusp ridges : PKT NO : 1

Add mesial and distal ridges to the buccal cusp and complete buccal contours by blending these ridges into the buccal surface.

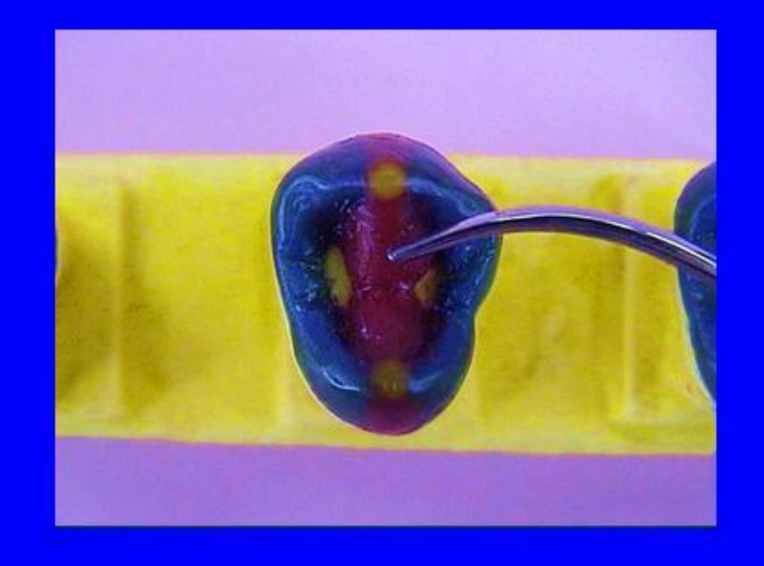
Check the inclines of the new ridges for compatibility by moving the articulator through excursions



# Cusp- marginal ridge for mandibular teeth

Triangular ridges : PKT no .1

Add triangular ridges to the buccal cusp . The base of these ridges should form the central groove of the occlusal surface. The ridges should be convex to insure optimal contact with opposing teeth.



# Cusp- marginal ridge for mandibular teeth

Cones for lingual cusp : PKT no. 1

Position the cones for lingual cusp (non functional )

Placed as far lingually as possible to prevent working side interferences.

The lingual cusp should be shorter than the buccal cusp.



# Cusp- marginal ridge for mandibular teeth

Triangular ridges : PKT no . 1

Add ridges to form lingual outline of the lingual contour.

Broad based triangular ridges with the PKT no .1 and will converge slightly toward the central fossa.

The contacts formed by each of the opposing cusp should form a tripod configuration






# Cusp- marginal ridge for mandibular teeth

Marginal ridges : PKT no. 1

Form marginal ridges by joining the buccal and lingual cusp ridges .

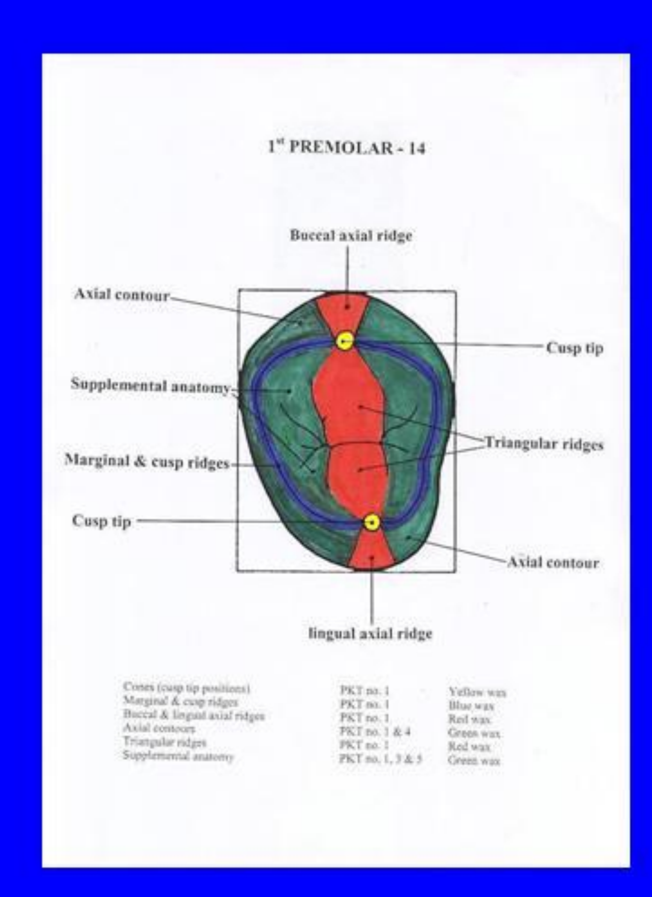
Smooth all grooves and fossae with PKT no. 3.

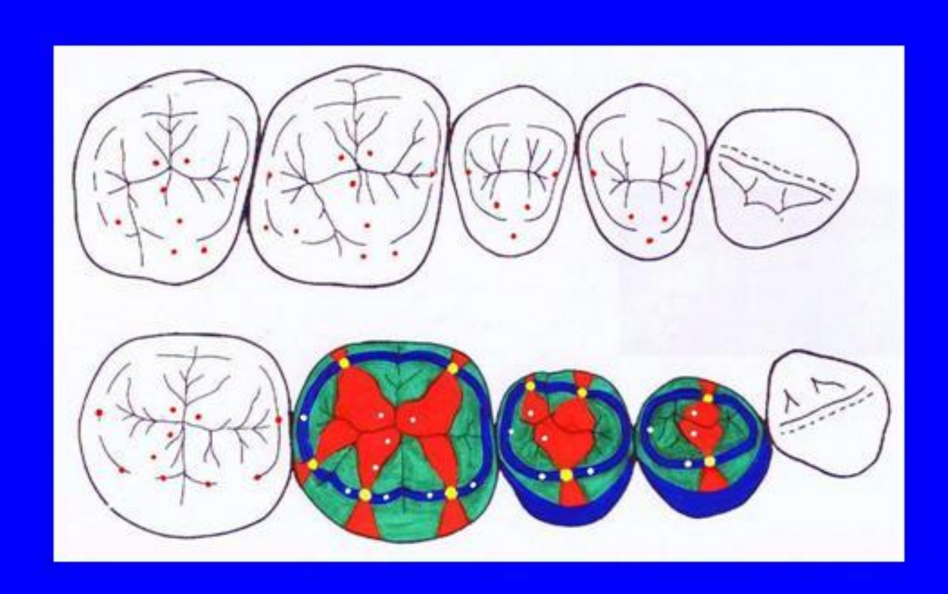
Round and finish the ridges with the PKT no.5.





# Cusp- marginal ridge for mandibular teeth



# Margin finishing

Remove wax pattern from die and relubricate the die.

Place wax pattern on freshly lubricated die.

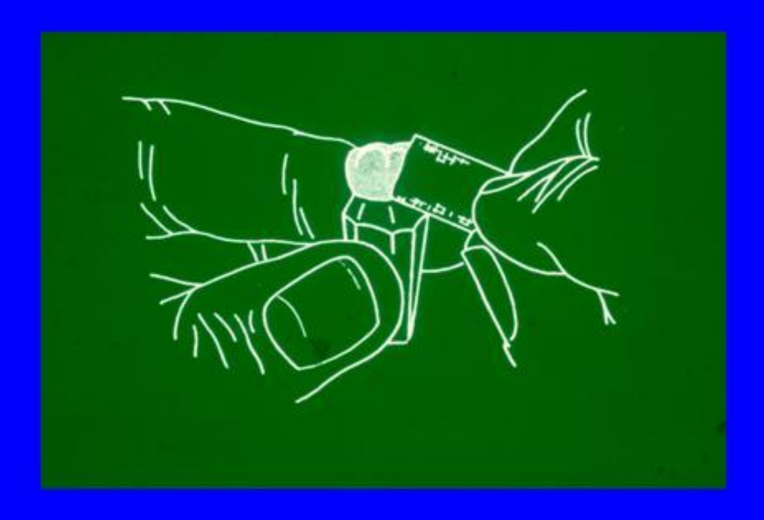
Remelt the entire margin with hot PKT no. 1
Add wax on the margin and carve precisely upto the margin with the PKT no.4



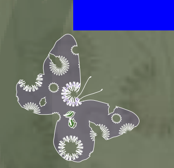
# Margin finishing

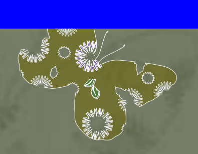
Check the margin carefully for the following discrepancies

1. Overwaxed margins
2. Short margins
3. Ripples
4. Thick margins
5. Open margins









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Thank you